

Moss Pigments

10. Isovitexin-7-glucoside in
Porella platyphylla (L.) Lindb.

ERLING NILSSON

*Institute of Chemistry, Organic Chemistry
Department, University of Uppsala, Box 531,
S-751 21 Uppsala 1, Sweden*

In 1911 Molisch¹ reported the occurrence of a glycoside, named saponarin, in *Porella platyphylla* (L.) Lindb. (*Madotheca platyphylla* Dum.). A survey of 36 species representing 27 genera of the *Hepaticae* resulted in a positive saponarin reaction (bluish colour with iodine and iodide ion) only with *P. platyphylla*. Recently, Reznik and Wiermann² detected quercetin and kaempferol in *Corsinia coriandrina*. No other investigations of flavonoids in the *Hepaticae* seem to have been published.

At the time of Molisch's investigation the constitution of saponarin was not known. It is now identified as isovitexin-7-glucoside (apigenin-6-*C*-7-*O*-diglucoside), first isolated from *Saponaria officinalis*.³

The present work was undertaken in order to verify the early identification of saponarin in *Porella platyphylla* by comparison with authentic material.

The *Porella* pigment and the reference compound (from *Saponaria officinalis* leaf) were isolated and purified by repeated paper chromatography. R_F -values (Table 1), UV spectral data (Table 2), appearance of chromatograms in UV light, melting points (mixed m.p.), and some other data (see Experimental), show that the compounds are identical. Thus, the flavone pigment in *Porella platyphylla* is isovitexin-7-glucoside.

A chromatographic survey showed that saponarin is present also in *Porella cordaeana* (Hübener) Evans, and *P. baueri* (Schiffner) C. Jens., while it is absent in *P. laevigata* (Schrad.) Lindb., and *P. thuja*.

Table 1. R_F -values of glucosides from *Porella platyphylla* and *Saponaria officinalis* on Avicel TLC plates.

Compound from	$R_F \times 100$ in ^a			
	BAW	H ₂ O	15 % HOAc	30 % HOAc
<i>P. platyphylla</i>	38	29	58	70
<i>S. officinalis</i> (saponarin)	38	28	58	70

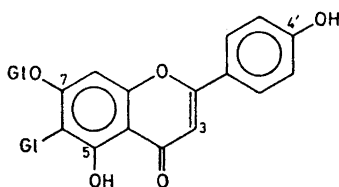
^a BAW = butanol-acetic acid-water (6:1:2, by vol.).

Table 2. Ultraviolet spectral data.

Compound from	λ_{\max} (nm) in					
	99.5 % EtOH		EtOH - AlCl ₃		EtOH - EtONa	
<i>P. platyphylla</i>	273	336	280, 348	302, 380	231, 270	259, 404
<i>S. officinalis</i> (saponarin)	273	336	280, 348	303, 380	233, 270	259, 403

(Dicks.) C. Jens. In addition to saponarin *P. platyphylla* and *P. baueri* contain a component with the same colour reactions with the exception of the iodine-iodide ion reaction, which is negative. This pigment will be subject to further investigation.

Experimental. The moss material was treated with 60 % aq. methanol (12 h) at room temperature. The concentrated extract was chromatographed on Whatman No. 3 MM paper with butanol-acetic acid-water (6:1:2) as solvent. A band (R_F about 0.4) with a purple appearance in UV light (350 nm) was cut and eluted with 60 % methanol. Repeated preparative paper chromatography with 15 % acetic acid as solvent, and precipitation from an ethanol solution with ether gave a yellowish white product with m.p. 210–215° (decomp.).



Isovitexin-7-glucoside
(Saponarin)

Isovitexin-7-glucoside was isolated from *Saponaria officinalis* leaf as described above. Its melting point was 210–215° (decomp.) and remained unchanged when mixed with the moss substance. Lit.,⁴ m.p. 228°.

Thin layer chromatography was performed on 0.25 mm Avicel cellulose plates. The solvent was allowed to run 12 cm. The spots on chromatograms are invisible (at moderate concentrations) in daylight, and deep purple in UV light. On fuming with ammonia the colours are yellow and greenish yellow in visible and UV light, respectively. Spraying with an aqueous iodine-potassium iodide

solution gives bluish spots, slowly changing to reddish brown. R_F -values are given in Table 1.

UV spectra were recorded on a Bausch and Lomb Spectronic 505 spectrophotometer. Spectral data are collected in Table 2, cf. Ref. 5.

Colour reactions are the same for both compounds. They give pink colour with magnesium and hydrochloric acid in ethanol, greyish brown with ferric chloride, and yellow with bases. Treatment with iodine-potassium iodide in water gives a dark blue precipitate.

Hydrolysis. The pigment from *P. platyphylla* was treated with a boiling mixture of methanol-conc. HCl (1/1, 12 h). The sugar was identified as *glucose* by chromatography against authentic material.⁶ In addition to some unchanged material two components (vitexin and isovitexin) with R_F 0.40 and 0.64 (TLC, Avicel) in 30 % acetic acid were obtained. R_F -values reported⁵ for vitexin 0.49, and isovitexin 0.67 (paper chromatography).

Porella specimens were obtained from the collections of the Uppsala Museum.

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